

REMARKS

Claims 17-25 remain pending. Favorable reconsideration is respectfully requested.

The present invention relates to a process for producing a purified resist polymer solution, comprising:

(1) dissolving a solid product comprising a resist polymer comprising a repeating unit decomposable by, and becoming alkali-soluble by, the action of an acid and a polar group-containing repeating unit, in a solvent (b) comprising one or more solvents selected from the group consisting of acetone, methyl ethyl ketone, tetrahydrofuran, ethylene glycol dimethyl ether, and ethyl acetate, and

(2) evaporating from the solution obtained in (1) the solvent (b) while adding, under reduced pressure with the temperature being controlled at 70°C or less, a solvent (a) comprising one or more solvents selected from the group consisting of propylene glycol monomethyl ether acetate, ethyl lactate, cyclohexanone, methyl amyl ketone, diethylene glycol dimethyl ether, diethylene glycol monoethyl ether, and γ -butyrolactone, where

the boiling point of solvent (b) is not higher than the boiling point of solvent (a) at atmospheric pressure, and

the amount of impurities having a boiling point at atmospheric pressure of not more than the boiling point of the solvent (a) is 1 mass% or less of the resist polymer in the purified resist polymer solution.

See Claim 17.

Thus, the claimed process involves a solvent exchange. Resist polymer is dissolved in solvent (b) and then evaporated while adding solvent (a) under reduced pressure with the temperature being controlled at 70°C or less. Solvent (a) has a higher boiling point as compared to solvent (b). See Tables 1 and 2. Compare also Example 1 and Comparative

Example 1, Example 2 and Comparative Example 2 and Example 3 and Comparative Example 3.

The rejections of the claims under 35 U.S.C. §103(a) over Sounik et al. in view of Sehm and further in view of Zampini et al. and further in view of Haubold et al. are respectfully traversed. The cited references fail to suggest the claimed process.

Sounik et al. discuss a solvent swap in paragraph [0121]. As recognized by the Examiner, there is no specific disclosure of the steps of the solvent exchange process. See page 4 of the Office Action dated February 17, 2010. Further, the purification process of Sounik et al. is described in Step 2 (paragraphs [0106]-[0108] and Step 4 (paragraphs [0114]-[0117]), which does not involve a solvent swap step.

Examples 1 and 3 of Sounik et al. describe the best mode of the invention described therein for obtaining a purified solid polymer and do not involve a solvent swap step. Those Examples use a far more complicated process as compared to the simplified process of the present invention and therefore take more time to obtain the purified polymer.

In addition, the resist polymer of the present invention is for an ArF excimer laser while the resist polymer of Sounik et al. is for a KrF excimer laser. The difference between an ArF excimer laser and a KrF excimer laser lies in their wavelengths. An ArF excimer laser has a wavelength of 193nm while a KrF excimer laser has a wavelength of 248nm.

With the short wavelength of an ArF excimer laser, a KrF resist cannot adapt to an ArF excimer laser. This is because a KrF resist polymer is prepared by using a monomer including an aromatic ring, but such aromatic ring in the polymer absorbs the ArF excimer laser having wavelength of 193nm (becomes opaque with respect to the excimer laser) which leads to significant degradation in property of the resist polymer. Therefore, it is essential that an ArF resist polymer be configured so as not to include an aromatic ring (for example, a polymer including an alicyclic group would be acceptable).

Based on this commonly-known technical knowledge in art, and from the disclosures of paragraphs 0004 and 0005 of the present application, one skilled in the art would understand that the resist polymer of the present invention is for an ArF excimer laser. For example, paragraph 0004 describes that hydroxystyrenes, which is commonly used for KrF resists, absorb light with a wavelength of 193nm and paragraph 0005 describes that (meth) acrylic acid monomer having a lactone structure is used for an ArF resist polymer.

The monomers used in Example 1 of the present application are 5-acryloyloxy-2,6-norbornane carbolactone (NLA) and 2-ethyl-2-adamantyl methacrylate (EAM) and in Example 2 are 5-methacryloyloxy-2,6-norbornane carbolactone (NLM), 2-ethylcyclopentyl methacrylate (ECpM) and]-hydroxy-1-adamantyl methacrylate (HAM), which are all monomers for an ArF resist polymer.

As explained above, it is understood the resist polymer of the present invention is for ArF excimer laser while the resist polymer of Sounik et al. is for KrF excimer laser, which means that the monomers used are different.

The Examiner recognizes that Sehm discloses a solvent exchange process for polymer slurries which can be performed in the polymer purification process of Sounik et al., but there is no suggestion in Sounik et al. to use a solvent swap in the actual purification process (Steps 2 and 3 of Sounik et al.). Since there is no suggestion for the solvent swap in the actual purification process of Sounik et al., there is no motivation to use the solvent exchange process of Sehm in the process described by Sounik et al.

Zampini et al. has been cited with respect to the teaching of distillation under reduced pressure. See page 5 of the Office Action. This reference fails to remedy the deficiencies of the combination of Sounik et al. and Sehm disclosed above.

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Haubold et al. has been cited with respect to the features of dependent Claims 23 and 24. This reference fails to remedy the deficiencies of the combination of Sounik et al. and Sehm disclosed above.

In view of the foregoing, the combination of Sounik et al. in view of Sehm and further in view of Zampini et al. and further in view of Haubold et al. fails to suggest the claimed process. Accordingly, the subject matter of the pending claims is not obvious in view of those references. Withdrawal of these grounds of rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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